CLAIMS

1. A process of production of a high strength galvannealed steel sheet comprising continuously hot-dip galvanizing a high strength steel sheet having a content of Si of 0.4 to 2.0 wt% during which making the atmosphere of the reducing zone an atmosphere containing H_2 to 1 to 60 wt% and comprised of the balance of N_2, H_2O, O_2, CO_2, CO, and unavoidable impurities, controlling, in the atmosphere, the $\log(PCO_2/PH_2)$ of the carbon dioxide partial pressure and hydrogen partial pressure to $\log(PCO_2/PH_2) \leq -0.5$, the $\log(PCO_2/PH_2)$ of the water partial pressure and hydrogen partial pressure to $\log(PH_2O/PH_2) \leq -0.5$, and the $\log(P_T/PH_2)$ of the total partial pressure P_T of the carbon dioxide partial pressure PCO_2 and water partial pressure PH_2O and the hydrogen partial pressure to $-3 \leq \log(P_T/PH_2) \leq -0.5$, performing the annealing in the reducing zone in a ferrite-austenite two-phase temperature region at 720°C to 880°C, then cooling by a plating bath and performing the molten zinc plating so as to form a hot-dip galvanizing layer on the surface of the cold rolled steel sheet, then heating for alloying the steel sheet on which the hot-dip galvanizing layer is formed at 460 to 550°C, it is possible to produce a high strength galvannealed steel sheet.

2. A process of production of a high strength galvannealed steel sheet as set forth in claim 1, characterized by performing the hot-dip galvanizing in a hot-dip galvanizing bath of a composition comprised of an effective Al concentration in the bath of at least 0.07 wt% and the balance of Zn and unavoidable impurities and performing the alloying at a temperature (°C) satisfying

$$450 \leq T \leq 410 \times \exp(2 \times [Al\%])$$

where, [Al%]: effective Al concentration (wt%) in the hot-dip galvanizing bath

3. A process of production of a high strength

galvannealed steel sheet as set forth in claim 1 or 2 superior in bondability, characterized by being performed at an effective Al concentration (wt%) in the bath satisfying the effective Al concentration in the bath of:

$$[Al\%] \leq 0.092 - 0.001 \times [Si\%]^2$$

where, [Si%]: Si content in steel sheet (wt%)

4. A manufacturing equipment of hot-dip galvanized steel sheet comprising providing a hot-dip galvanizing bath and continuously plating a steel sheet by molten zinc, said system for production of a hot-dip galvanized steel sheet for working the process of production of a high strength galvannealed steel sheet described in claim 1 characterized by making the annealing furnace an all radiant tube type annealing furnace and providing an apparatus for introducing into the annealing furnace a gas containing CO_2 in an amount of 1 to 100 wt% and comprised of the balance of N_2, H_2O, O_2, CO, and unavoidable impurities.

5. A system for production of a hot-dip galvanized steel sheet comprising providing a hot-dip galvanizing bath and continuously plating a steel sheet by molten zinc, said system for production of a hot-dip galvanized steel sheet for working the process of production of a high strength galvannealed steel sheet described in claim 1 characterized by making the annealing furnace an all radiant tube type annealing furnace and providing an apparatus for burning CO or a hydrocarbon in the annealing furnace and producing a gas containing CO_2 in an amount of 1 to 100 wt% and comprised of the balance of N_2, H_2O, O_2, CO, and unavoidable impurities.